

6 UNCERTAINTIES IN CARBON SEQUESTRATION

There are many uncertainties related to carbon sequestration, such as the driving issue, global warming. Actual temperature data is basically unavailable prior to the 1800's, which make it very difficult to determine if the recent increase in global temperatures is part of a long-term trend or not. Models have been used to estimate temperatures based on geological physical properties, but without actual temperature data, is primarily speculative. However, in this discussion, the focus will not be on climate change but carbon sequestration and carbon markets.

The majority of the uncertainties related to carbon sequestration is in quantification and its effect on offsetting greenhouse gas emissions. There are also uncertainties regarding practice acceptability, local impacts, economic benefit, and other non-scientific elements that need to be further addressed during any development of carbon sequestration activities and markets.

There are issues outside of the control of the state, such those driving forces that will make or break carbon markets. Regulations restricting emissions of greenhouse gases will certainly have the greatest impact on carbon markets. Without direct restrictions on sources, there will not likely be any incentive to offset emissions. If regulations arise, then what will their real effect be on sources? Will they be so restrictive requires sources to look elsewhere to offset what they cannot reduce on-site? Are there sources that cannot simply upgrade facilities to meet new restrictions? If these restrictions come to pass on sources, and greenhouse gas offsets are needed, then carbon markets are likely to become beneficial to landowners and Idaho. How much benefit the state could see is completely yet to be determined.

Based on the assumption that greenhouse gas emissions will be restricted, and that sources will not meet those requirements entirely at the source, carbon dioxide and other greenhouse gases could be offset by voluntary carbon sinks (or by non-regulated emission sources). What assurance will those being regulated need to ensure that a specific quantity of carbon dioxide or other gases are actually offset? What assurance will the carbon sink have from regulators that they won't become regulated once providing those offsets? Numerous carbon market (emissions trading) rules will need to be worked out prior to much participation. There is much uncertainty regarding the legality of emissions trading, which will have to be worked out among regulators, emission sources, and potential carbon offset participants.

The economics of carbon markets are uncertain. Will there be a wide margin of costs between emission source mitigation and carbon offset costs? The emission source will need offset costs to be lower than their own mitigation costs for it to be feasible. Additional funds may be needed, for items such as legal fees, transaction costs, trade tracking, and monitoring. If the margin of cost is relatively narrow between two potential participants, than it may not be feasible to participate in trades.

There also physical, cultural, social, and economic barriers and uncertainties that keep landowners from adopting some conservation practices, which could be used to generate carbon credits in the state. A study has recently been done by the USDA-NRCS Social Sciences Institute, regarding the barriers and strategies for adoption of conservation buffers, explored landowner's attitudes, behaviors, and uncertainties (see http://www.ssi.nrcs.usda.gov/ssi/B_Stories/2_Tech_Notes/T022_Buffers.pdf). Based on numerous interviews with producer groups, field specialists and other conservation partners, observations on the common barriers to adoption of conservation buffers were recorded for analysis. Some of the barriers and uncertainties keeping landowners from adopting these observation practices included:

- Lack of information on site-specific agronomic, economic, and environmental cost and benefits
- Costs of installing buffers seemed excessive,
- Practice not in line with farmer's personal goals and values, or fit in operation

- If buffers installed, land viewed as idle, no longer productive,
- Landowners unsure that equipment operators would keep buffers in place.

An Idaho demonstration project that basically develops a system of emissions trading, carbon market, would clear up many of these uncertainties and issues described above. The demonstration would involve numerous public interests, besides those potential carbon market participants, to ensure public approval. Many of the issues that a demonstration project would have to address are listed below:

- The effect of regulations on greenhouse gas sources
- Predicting and quantifying soil carbon, above- and below-ground biomass stored carbon
- Predicting and quantifying methane emissions from animal waste storage ponds and livestock enteric fermentation
- Predicting and quantifying nitrous oxide emissions from cropland activities,
- Calculating a whole-farm, field, or project's net carbon sequestration level, which discounts land use related greenhouse emissions
- The potential quantity of agricultural products that are available and could be made available for biofuels production
- The potential quantity of agricultural products that are available and could be made available for bioenergy production, such as in co-fired facilities
- The potential future electrical demand in the state, from coal-fired electrical facilities
- Legal ramifications of long-term contracts between buyers and agricultural and forest landowners
- Landowner costs and benefits while implementing practices and participating in carbon markets
- Statewide costs and benefits while implementing practices and participating in carbon markets

Most of those barriers and uncertainties listed above could be overcome through the employment of a carbon market demonstration project. If the state and carbon market participants understand the landowner's and emission source's positions as to why and how they perceive barriers and uncertainties, the development of a sound carbon market is more likely to occur. Within a demonstration project, a few comprehensive whole-farm and state-wide analysis could also be done simultaneously to help address these uncertainties.